

SENNIGER, POWERS, LEAVITT & ROEDEL

One Metropolitan Square
16th Floor
St. Louis, Missouri 63102

Telephone (314) 231-5400
Facsimile (314) 231-4342

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U.S. Serial No. 09/408,323

DATE: 9/13/02 SPLR FILE No. MTC 6610 SENT BY VMKFACSIMILE NUMBER BEING CALLED: (703) 746-5225

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NAME: Examiner Leigh C. Maier

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Examiner Maier,

Here is a rough outline of some
of the things we wish to discuss
with you regarding Serial No. 09/408,323.
See you at 1:30 p.m.

Vincent Keil

INTERVIEW OUTLINE U.S. SERIAL NO. 09/408,323 (MTC 6610)

1. check status of petition to add Jingyue Liu and William A. Scholle as inventors filed June 21, 2002
2. obviousness-type double patenting rejection of claims 57, 91, 144, 274 and 292 based on claims pending in U.S. Serial No. 09/408,296 is noted and can be overcome by filing a terminal disclaimer
3. summary of the 16 independent claims
 - a. processes for the preparation of N-(phosphonomethyl)glycine or a salt thereof
 - i. deeply reduced characteristics w/o a promoter - 1 (maximum CO yield), 13 (minimum C:O surface ratio) and 23 (minimum C:O surface layer ratio)
 - ii. deeply reduced process steps w/o a promoter - 33 ($\geq 400^{\circ}\text{C}$ after deposition) and 49 (exposure to reducing environment and predeposition minimum C:O surface ratio)
 - iii. deeply reduced characteristics w/ a promoter - 79 (minimum C:O surface layer ratio)
 - iv. catalyst comprising a carbon support having a noble metal, carbon, and oxygen w/ a promoter at a surface of the carbon support - 53
 - v. continuously contacting an aqueous feed stream comprising N-(phosphonomethyl)iminodiacetic acid or a salt thereof with an oxygen source in a stirred tank reactor of a continuous reactor system - 100
 - b. process for oxidizing a reagent in a mixture able to solubilize a noble metal in the presence of oxygen
 - i. deeply reduced characteristics w/o promoter - 248 (maximum CO yield), 256 (minimum C:O surface ratio) and 263 (minimum C:O surface layer ratio)
 - ii. deeply reduced process steps w/o promoter - 270 ($\geq 400^{\circ}\text{C}$ after deposition) and 288 (exposure to reducing environment and predeposition minimum C:O surface ratio)
 - iii. deeply reduced characteristics w/ promoter - 252 (maximum CO yield), 259 (minimum C:O surface ratio) and 266 (minimum C:O surface layer ratio)
4. non-final OA mailed June 18, 2002
 - a. claims 10, 11 and 117-199 rejected for indefiniteness under §112, 2nd paragraph
 - i. claims 10 and 11 will be amended to provide proper antecedent basis
 - ii. dependent claim 117 is not vague or indefinite
 - b. claims 1-34, 49-52, 200-229, 248-251, 256-258, 263-265, 270, 271, 288 and 289 rejected as unpatentable over EP 0 019 445 (Nitrokemia) in view of U.S. Patent No. 4,264,776 (Hershman et al.), van Dam et al. (*Journal of Catalysis*, 1991) and U.S. Patent No. 4,624,937 (Chou)
 - i. The general disclosure in Nitrokemia regarding use of a noble metal on carbon catalyst in the oxidation of N-(phosphonomethyl)iminodiacetic acid is misleading and fails to recognize the well-known problems associated with leaching of expensive noble metals from catalyst used in such an acidic, highly oxidative environment (See, for example, U.S. Patent No. 5,179,228 (Martin Ramon

et al.) at col.1, lines 40-47). Although use of noble metal on carbon catalyst offers the advantage of reduced formation of undesirable byproducts, prior to the present invention, such use was not commercially viable.

- ii. Applicants have discovered that, by use of "deeply reduced" catalysts that satisfy the various characterizing standards set forth in the claims, PMIDA reagents can be effectively oxidized with further reduction in the loss of noble metal from the carbon support in the course of a catalytic oxidation reaction conducted in an aqueous medium. The improved resistance to solubilization of the noble metal provided by using a deeply reduced catalyst in accordance with the present invention contributes in overcoming a significant obstacle which has previously compromised the economic feasibility of using a noble metal on carbon support to catalyze the oxidative cleavage of a carbon-nitrogen bond of PMIDA reagents. Use of a deeply reduced noble metal on carbon catalyst in the oxidation of PMIDA reagents provides for substantially quantitative oxidation to glyphosate or its salts and effective oxidation of the C₁ byproducts of the reaction (formaldehyde and formic acid) to be maintained for a prolonged period and/or over numerous oxidation cycles without the excessive loss of noble metal as is otherwise typically encountered in acidic aqueous oxidation media.
 - iii. Applicants teach a variety of stratagems that may be employed to obtain a deeply reduced catalyst as claimed, including deoxygenating the carbon support prior to noble metal deposition, depositing the noble metal in one of its more reduced oxidation states (e.g., elemental platinum or a salt of Pt(II) instead of a salt of Pt(IV)) and reducing the surface of the catalyst after noble metal deposition by heating the surface (e.g., most preferably at temperatures of from about 550 to about 900°C) in a non-oxidizing environment (e.g., nitrogen, argon and helium) and/or exposing the surface to a reducing environment (e.g., formaldehyde, formic acid, amines, ammonium ions, and sodium borohydride (NaBH₄)) or a gas-phase reducing agent (e.g., hydrogen, ammonia and carbon monoxide).
 - iv. A person practicing the catalyst preparation techniques disclosed in Hershman, van Dam and Chou would not obtain the "deeply reduced" characteristics of carbon monoxide desorption yield and/or C/O surface ratio recited in independent claims 1, 13, 23, 49, 248, 256, 263 and 288.
 - v. No teaching or suggestion of utilizing a noble metal on carbon catalyst in the oxidation of N-(phosphonomethyl)iminodiacetic acid or a salt thereof wherein the catalyst is heated to a temperature of at least about 400°C after noble metal deposition as called for in independent claim 33.
- c. claims 1-99, 200-241 and 248-300 rejected as unpatentable over Nitrokemia in view of U.S. Patent Nos. 4,186,110 (Jalan) and 5,876,867 (Itoh, et al.), Hershman and Chou
- i. No motivation to combine teachings of Jalan or Itoh directed largely to electrocatalysts for fuel cell applications with Nitrokemia and modify the teachings of the primary reference. Vague statement regarding use in "chemical processes" is so non-specific as to be virtually meaningless and certainly no motivation to combine the reference teaching with the disclosure in Nitrokemia regarding oxidative cleavage of a PMIDA reagent.
 - ii. A person practicing the catalyst preparation techniques disclosed in Jalan and Itoh would not obtain the "deeply reduced" characteristics of carbon monoxide desorption yield and/or C/O surface ratio recited in independent claims 1, 13, 23, 49, 79, 248, 252, 256, 259, 263, 266 and 288.
 - iii. No teaching or suggestion of utilizing a noble metal on carbon catalyst in the oxidation of N-(phosphonomethyl)iminodiacetic acid or a salt thereof wherein the catalyst is heated to a temperature of at least about 400°C after noble metal deposition as called for in independent claim 33.

- iv. No teaching or suggestion of utilizing a noble metal on carbon catalyst including a promoter in the oxidation of N-(phosphonomethyl)iminodiacetic acid or a salt thereof as called for in independent claim 53.
- d. claims 100-199, 242-244 and 247 the "continuous process claims" rejected as obvious based on Nitrokinin in view of combinations of Jalan, Itoh, Hershtman, van Dam, Chou and newly cited U.S. Patent No. 6,153,753 (Johnson, et al.)
 - i. Only Johnson discloses carrying out a reaction in a continuous stirred tank reactor as called for in claim 100. However, the reaction disclosed by Johnson is the oxidative dealkylation of N-alkyl-N-(phosphonomethyl)glycine (N-substituted glyphosate) in the presence of a noble metal on carbon catalyst to generate glyphosate (See col. 16, line 5 to col. 19, line 24). The oxidative cleavage of N-(phosphonomethyl)iminodiacetic acid to produce glyphosate is part of several of the reaction schemes disclosed by Johnson. However, contrary to the assertion on page 9 of the Office action, applicants have not found any mention in Johnson of using a continuous stirred tank reactor to carry out the oxidation of N-(phosphonomethyl)iminodiacetic acid to glyphosate.
 - ii. In any event, JOHNSON can be disqualified as prior art under 35 U.S.C. §103(c)/§102(e) by filing these claims in a continuation application (i.e., with a filing date on or after November 29, 1999) and establishing that the continuation application and JOHNSON were owned by Monsanto Company at the time the invention defined in these claims was made.
 - iii. In the absence of JOHNSON, a prima facie case of obviousness with respect to claim 100 is lacking.